Polychaeta of the Falkland Islands

Fieldwork & Initial Results
Report to the Shackleton Scholarship Fund Committee

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Introduction

The polychaete fauna of the Falkland Islands has been sparsely investigated up to now. Some research was done and published at the beginning of the twentieth century, notably by Pratt (1898, 1901), Pixell (1914), Ramsay (1914), Fauvel (1916) and Monro (1930, 1936). These publications were mainly related to shore collections undertaken by Rupert Vallentin and offshore samples taken as part of the Scottish National Antarctic Expedition and the later *Discovery* research cruises. Other Antarctic research cruises have taken some samples in the locality of the Islands but these have generally been offshore and sparsely located. In 1996, Tingley *et al.* carried out a shallow subtidal survey by diving around the Islands. However, as with most dive surveys, polychaetes were rarely recorded and then mostly unidentified beyond family level.

Unusually, the intertidal fauna has been less researched than that found offshore and is not well known at all.

An approach to the Shallow Marine Surveys Group (SMSG) was made in December 2010 to determine whether a project to investigate the polychaetes of the Falkland Islands would be feasible. Following discussions with Dr Paul Brickle, Chairman of the group, an application was made to the Shackleton Scholarship Fund for money to support travel to the islands to undertake the fieldwork. The application was successful and an award of £2000 made in April 2011. Fieldwork was planned for November-December 2011 to coincide with survey work being undertaken by SMSG that could contribute to the project. It would also be Spring in the islands with weather more favourable for collecting. Fieldwork was concentrated around East Falkland and consisted mainly of shore collecting but with some subtidal collecting by diving included where possible.

Methods

Sampling sites were chosen according to several criteria:

• as far as possible, all sites were ones that could be accessed off a main road. The only two exceptions to this were Teal Creek and Camilla Creek (sites 35 & 36) for which specific directions were obtained and visible off-road tracks were present;

• sites were chosen that faced different directions and were from different areas of the island as such differing levels of exposure to prevailing weather can affect the habitats and what animals are associated with them;

• sites with different types of shore – rocky, sandy, muddy – were chosen to provide a range of habitats to sample.

Shore Collecting

Shore collections were made by a variety of methods according to the type of shore. Where sediment was present, samples of this would be sieved through a 0.5 mm mesh and the residue retained for later analysis. This method collects smaller specimens that would not be picked out by hand *in situ*. Larger specimens, more easily spotted and collected individually, were found by turning over rocks and inspecting both the underside and the ground beneath for free-living and attached specimens, digging into the sediment and washing out animals found within and picking out tubes seen in the sediment.

Rocky shore collections were made by inspecting and turning over rocks where possible and picking off any free-living animals and tubes where seen. Where algae was present, scrapings at the base of the alga against the rock were done, collecting any holdfast present and, if there was loose sediment at the bottom of rock pools, this was also investigated for animals.

Site plans were drawn for each shore site, marking where samples were taken from in relation to other features of the site. This would enable myself or anyone else to return to the same place if desired at a later date.

Samples were taken from high shore down to low shore level, following the tide as it ebbed as polychaete communities generally change with height on the shore. If there were different types of habitat present on a shore, each of these would be sampled.

Some help with shore collecting was provided by Freya Gill, a local volunteer, who assisted both on the shore and in the laboratory on some days.

Diver Collecting

Diving was undertaken as part of two planned SMSG surveys, one around Cochon Island and the other around Egg Harbour and Kelp Harbour off Falkland Sound.

Collecting while diving is more complicated than working on shores due to the inhibitions of equipment affecting the ability to move around underwater. Different sized re-sealable bags were carried for placing specimens into and these in turn could then be placed into a mesh bag for easier carriage to the surface and later investigation. Animals were collected by turning over rocks, inspecting the underside and the sediment beneath for both free-living animals and attached tubes. Samples of loose sediment were also taken using a small trowel to dig with. Algal holdfasts were collected if of a feasible size and rock scrapings were made where epifaunal growth provided a potential habitat for other animals.

After the dive, samples could be sorted either onboard ship or on shore and placed into pots. Any sediment that needed sieving was put through a 0.5 mm mesh sieve and the residue retained.

Specimens were mainly collected during my own dives but others members of the team also brought back animals on occasion that they found during their own survey work.

Laboratory work

Laboratory facilities were supplied by the Fisheries Department in Port Stanley, with access to microscopes (including a camera microscope) and chemicals.

Shore samples were collected live in the field and maintained in seawater until return to the laboratory. Specimens were relaxed with a 7% magnesium chloride solution to enable close inspection under a microscope. As far as possible, animals were individually inspected and notes made. Some were also photographed using a camera microscope to record pattern and colour information. Identifications to family level were generally possible but not beyond that.

Those samples collected as unsorted 'sievings' were relaxed for a short time and then fixed without further observation. Such samples must be investigated under the microscope as they often contain numerous tiny specimens to pick out and subsequently take a long time to work through. This work was to be carried out back in the UK.

Samples collected by diving or from field collections a long way from the laboratory were also relaxed for a short time and then fixed without further investigation. Although some specimens were readily identifiable to family level by eye, smaller specimens could not be and it was better to fix them quickly while still in good condition to observe later.

Specimens were fixed in a 4% formaldehyde solution. Those specimens that had been in formaldehyde for a minimum of four days were then transferred to 70% ethanol for longer term preservation. This was also essential to preserve the condition of any animals that build calcareous tubes (e.g Spirorbidae, Serpulidae) as such structures are adversely affected by the acidic formaldehyde. Those specimens collected in the last few days of fieldwork were kept in formaldehyde until after shipment to the UK. Once there, all specimens were transferred to an 80% industrial methylated spirits (IMS) solution with 2% propylene glycol added to inhibit fungal growth and reduce possible damage by dehydration. No specimens were in formaldehyde for more than 3 weeks.

At the time of writing only samples 1 to 18 have been identified to family level. Any comment on identifications beyond that level or for those samples not yet worked on are speculative only.

Fig. 1: Laboratory facilities were provided at the Fisheries Department in Port Stanley

Fig. 2: All of the collected samples (around 200) sealed around the lids and some already further sealed into plastic bags for shipment back to the UK

Fig. 3: Boxed-up samples ready for posting

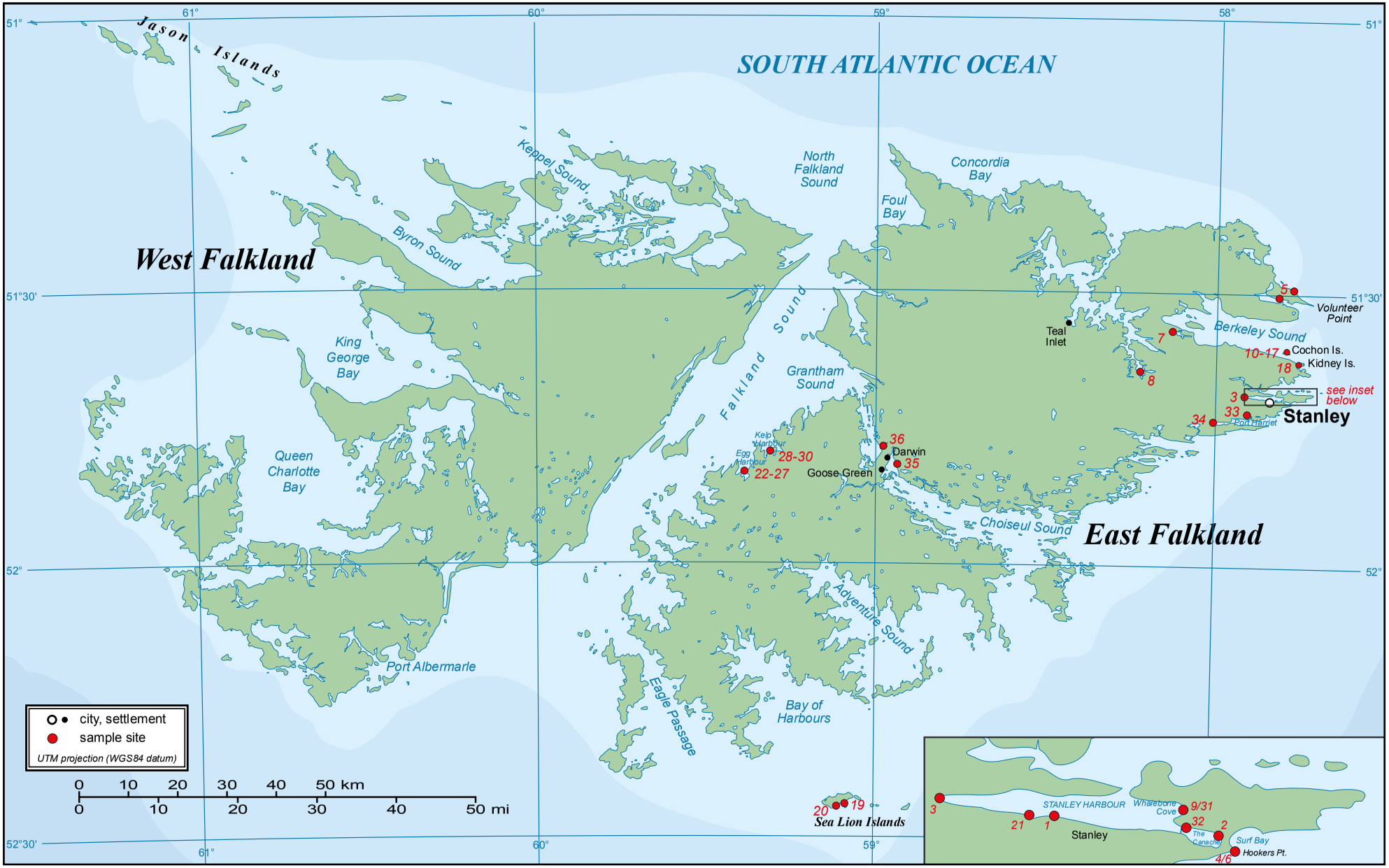

Fig. 4: Map of the Falkland Islands showing location of sample sites. Inset box (bottom right) with large scale view of Stanley area

Site 1
Stanley, between Government Jetty & Public Jetty
15th November 2011

Fairly straight strip of foreshore in the centre of town made up of small rocks over a coarse sand base. Little change in sediment type from high to mid shore which is only a distance of a few metres. Thirteen different families represented across 3 samples.

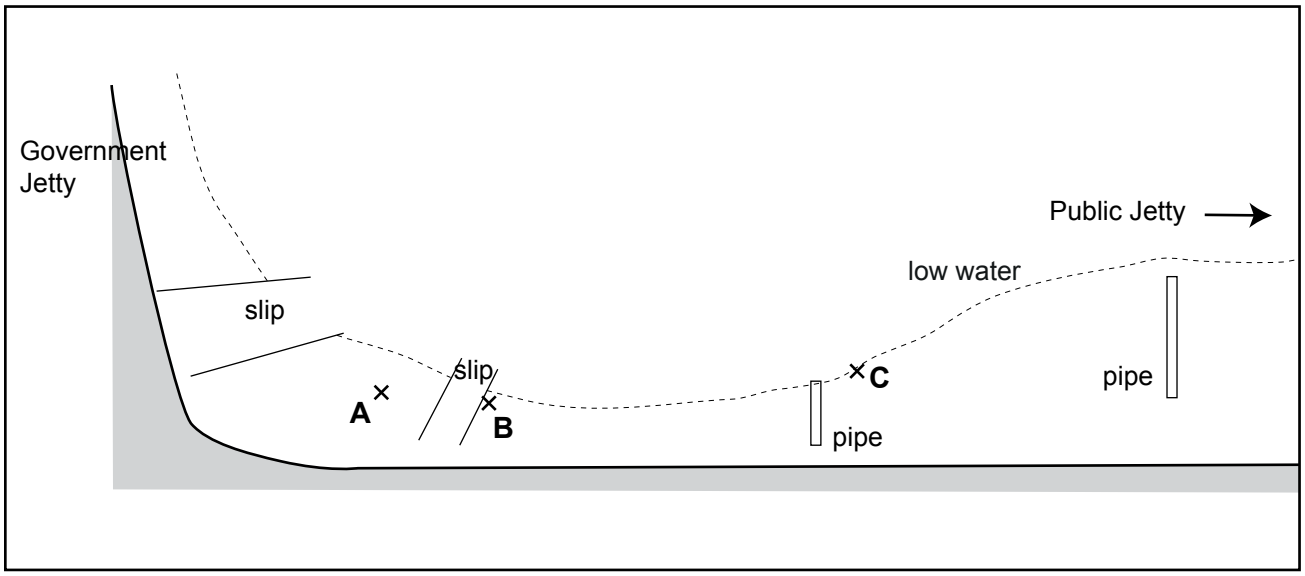

Fig.5: Site plan of Stanley foreshore

A: 51° 41.454′ S 057° 51.870′ W
Mid-high shore; under rocks in coarse sand

B: 51° 41.459′ S 057° 51.840′ W
Mid shore; under rocks in coarse sand

C: 51° 41.459′ S 057° 51.823′ W
Low shore; under rocks in coarse sand

Cirratulids, nereids and terebellid worms were present at all levels of the shore but were more common from the mid-low shore area down. Only a single species in each family appears to be present although two different species of maldanid, present in samples B & C, were recorded.

Fig. 6: View of shore toward Government Jetty. Freya in foreground looking for polychaetes.

Site 2
The Canache, east of Stanley
16th November 2011

Sheltered bay, separated from the rest of Stanley Harbour by the narrow mouth and bridge at the Marina. A small spit, mostly covered at high tide, juts out into the bay in the northeast corner. As the tide ebbs, a small sandy beach uncovers on the east side of the spit. The spit itself is surrounded by small rocks which are covered in a mat of algae on the east and south edges, less so on the more exposed western side. Rectangular pools have been dug into the rock in the mid-low tide area (purpose unknown) which retain water as the tide retreats. Samples were taken at different tide levels on the sandy beach and from the rocky area on the west side. Maldanids and syllids were present in all samples, as well as orbiniids in all but sample D.

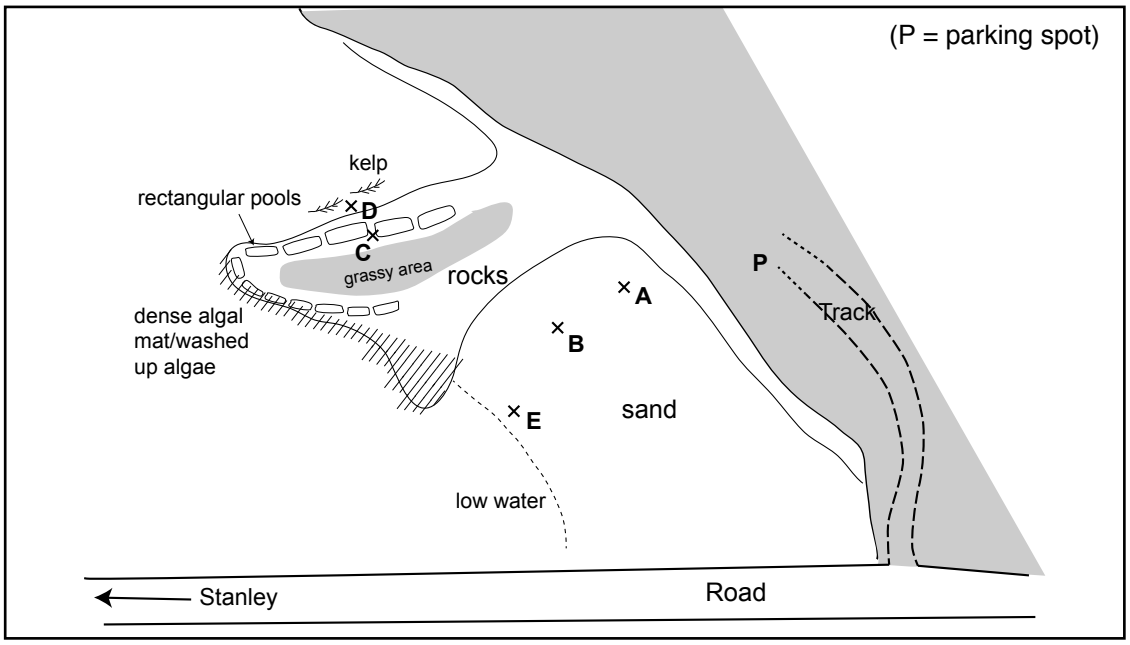

Fig.7: Site plan of The Canache

Fig. 8: View over The Canache shoreline, sandy beach in front, rocky spit to right

A: 51° 41.680′ S, 057° 46.967′ W

High shore; arenicolid juveniles with some maldanid tubes (see Fig. 9). Brown, medium sand, turning grey a few cm beneath with a slight smell. Many small bivalves.

Fig. 9: Photograph showing the large tracks of the maldanid tubes vertically in the sand

B: 51° 41.708′ S, 057° 46.996′ W

Mid shore, very similar to A but maldanid tubes much more common out-competing the arenicolids to be the dominant species. Some large Orbiniidae, 2 species present.

C: 51° 41.716′ S, 057° 47.107′ W

West side of spit, at the edge of the rectangular pools, under rocks and in the underlying sand. Species similar to those in the earlier sand, although in lower density. Scaleworms also present on some rocks.

D: 51° 41.708′ S, 057° 47.117′W

Larger rocks below low tide mark to approx. 20cm. 1 small *Macrocystis* holdfast hauled in and inspected. Four (apparently) different species of nereid collected.

E: 51° 41.731′ S, 057° 47.001′ W

Sample E was back in the sandy bay down at the low tide mark. Fauna was still dominated by numerous maldanid tubes and the sand type did not appear to have changed from the upper shore.

Fig. 10: Rectangular rock pools around the edge of the rocky spit

Site 3
Moody Brook, west of Stanley
17th November 2011

Soft, estuarine area where Moody Brook stream feeds into Stanley Harbour. The stream enters at the northern edge of the bay with a rocky edge on the northern bank and an area of large boulders in mud on the southern side changing to fine muddy sand to the southern side of the bay. Orbiniids were the only group represented at every location.

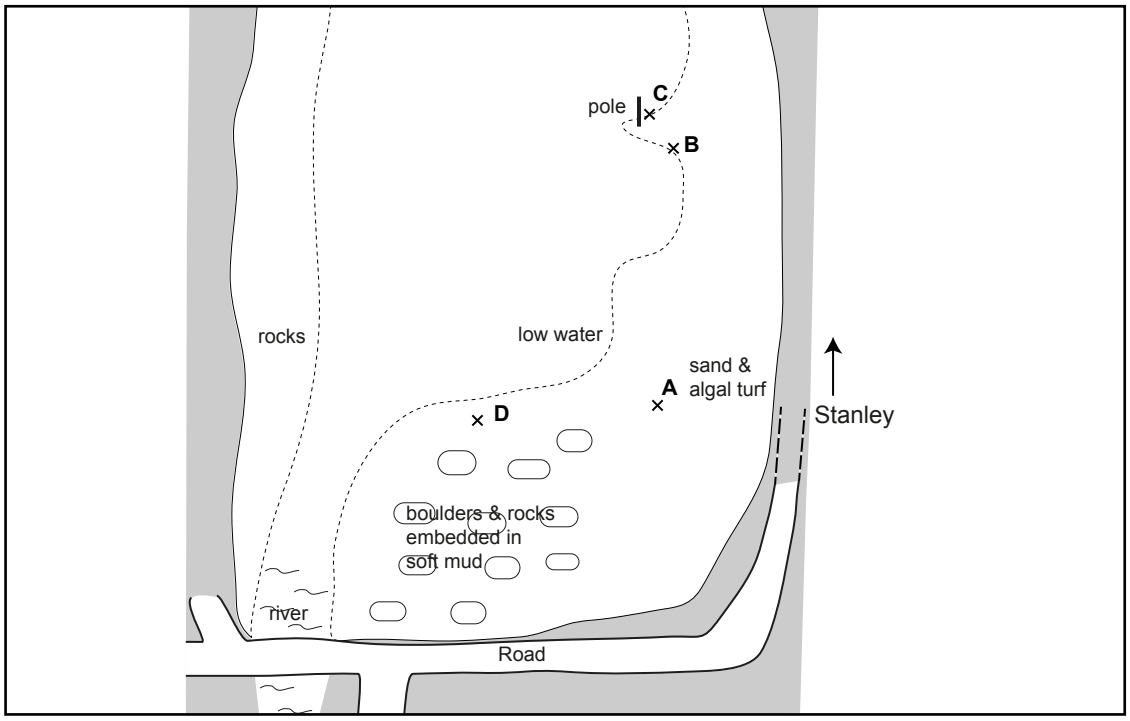

Fig. 11: Site plan of Moody Brook

Fig. 12: View down the shore at Moody Brook

A: 51° 41.211′ S, 057° 55.189′ W
Mid-shore, soft algal mat covering muddy fine sand. Few animals apparent in the algal mat or beneath.

B: 51° 41.201′ S, 057° 55.099′ W
Low shore, similar sediment to A but softer with a greater mud element. Mostly the same groups collected as from A although whether the species are the same is as yet unknown.

C: 51° 41.204′ S, 057° 55.096′ W
Low shore, located close to sample B, this spot was a little further down and out on the shore. More rocky than the other samples and covered with an algal mat. Under the rocks was black, coarse sand and gravel. Several large terebellids were collected from gravelly tubes attached to the rocks, some with commensal scaleworms. This was the most diverse sample with nearly twice as many families represented.

D: 51° 41.179′ S, 057° 55.202′ W
Mid-low shore, very soft sandy mud, overlaid in some areas with a thin algal turf. Closest site to the river entry point.

Fig. 13: Soft mud with algal mat covering at position D

Surf Bay

18th November 2011

51° 41.937′ S, 057° 46.656′ W

Large, exposed sandy bay, open to the east, with fine white/grey sand. Sampling was attempted at the southern edge of the bay near the rocks. However, no animals were seen even after digging at various levels on the shore and particularly around low shore. Sand was sieved at low shore through a 300μm sieve and the washings investigated with a microscope but only a few amphipods and isopod crustaceans were found. This site was therefore not sampled further.

Fig. 14: Surf Bay

Site 4

Hookers Point

18th November 2011

51° 41.994′ S, 057° 46.747′ W

Directly south of Surf Bay on the southern side of Hookers Point headland is an area of exposed rocky shore with large rock pools at low shore. Several of the rocks were covered with an encrusting pink alga and there were also some small seaweeds attached. The encrusting alga was thick and difficult to remove with no evidence of burrowing fauna. A few small algal holdfasts were also sampled with associated fauna.

The few samples taken showed potential for a greater diversity to be found with several animals evident that had not been seen elsewhere. It was therefore decided to return to the site on a later date to undertake more extensive sampling (see Site 6).

Site 5
Volunteer Point
20th November 2011

Volunteer Lagoon: large, enclosed lagoon with narrow input from the sea to the east. Samples were taken from the beach below the bowl where camping is permitted. Gravelly shore leading down to subtidal muddy fine sand with gravel patches beneath the sand. Sand remains subtidal at low tide, covered by a few inches of water at all times.

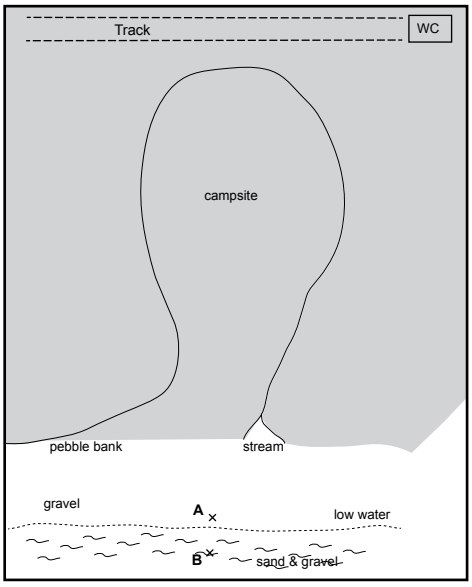

Fig. 15: Left. Site plan of Volunteer Lagoon. Above. Volunteer Lagoon

A: 51° 28.753′ S, 057° 50.432′ W
Mid-low shore, rocks over gravel & coarse sand. Samples washed in a bucket and elutriated through a sieve. Not very diverse sample, heavily populated by oligochaetes and isopod crustaceans.

B: 51° 28.752′ S, 057° 50.437′ W
Subtidal 0.5-1 foot depth, soft sand with gravel below in some places. Sediment sieved and sievings fixed. More diverse than the intertidal sample but still surprisingly few number of families recorded.

*Volunteer Beac*h: long, white, fine sand beach exposed to the north. Much kelp washed up along the sand.

C: spirorbid and serpulid tubes attached to the washed-up bladders of *Macrocystis* kelp

Fig. 16: Volunteer Beach

Fig. 17: Macrocystis *bladder with attached spirorbid tubes*

Site 6
Hookers Point (position as for Site 4)
21st November 2011

This was a return to the same site as sampled previously in order to do a more extensive collection. Samples were taken from various positions around the rock pool and on the surrounding rocks but as all samples were taken within a 5 m radius only a single position was recorded for the site (taken 18.11.2011).

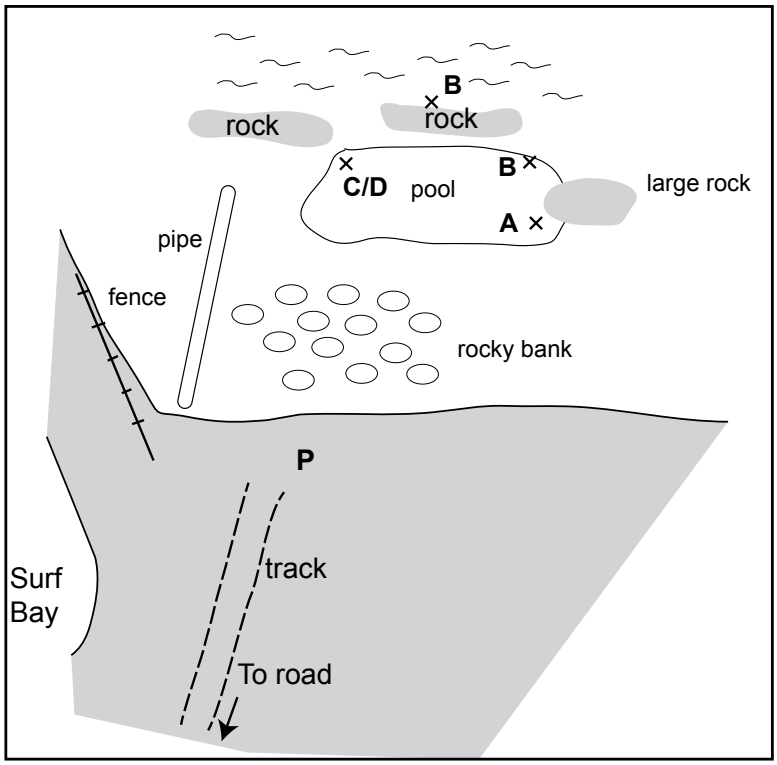

Fig. 18: Site plan of Hookers Point

Fig. 19: Rocky shore and pools at Hookers Point

A: samples of bleached (white) encrusting algae where the encrusted rock remains above the surface of the water. The bleached encrustations were easier to remove than the pink crusts and a burrowing fauna was evident within the removed crusts. In-crust fauna was mainly made up of *Boccardia* species which burrowed into the calcareous crusts with several nereids also inhabiting the crust/rock interface. The crust itself was also covered in filamentous algal turf that contained many tiny sabellid fanworms and isopod crustaceans.

B: algal scrapings with their holdfasts from the surrounding rocks around the pool.

C: samples of live pink encrusting algae from rocks that remain submerged in the pool. The fauna appeared to be similar to that from the bleached crusts with many *Boccardia*.

D: towards the edge of the pool, some smaller rocks were embedded in a mixture of large gravel and coarse sand. This was sampled with a trowel and sieved. A diverse fauna was identified from these samples with some large and interesting but unfortunately damaged specimens that have not yet been seen in any other samples. It is hoped to return and do some more sampling from this spot to try and collect more specimens.

Fig. 20: Photograph showing submerged pink encrusting algae and the exposed white encrustations.

Fig. 21: Left: Boccardia *species found burrowing into the pink encrusting algae at Hookers Point. Right: Close-up of head region.*

Site 7

Inlet from Uranie Bay/Port Louis Harbour, just inside boundary of Mount Kent with Brookfield Farm
22nd November 2011

A small stream feeds down into this inlet which drains out to an exit opposite Long Island, between Uranie Bay to the southeast and Port Louis Harbour to the northwest. At high tide the inlet is full up to the stream but empties rapidly as the tide ebbs to leave a very soft muddy inlet with harder clay to the edges. The inlet drains so far out that this site was not sampled to the low water point.

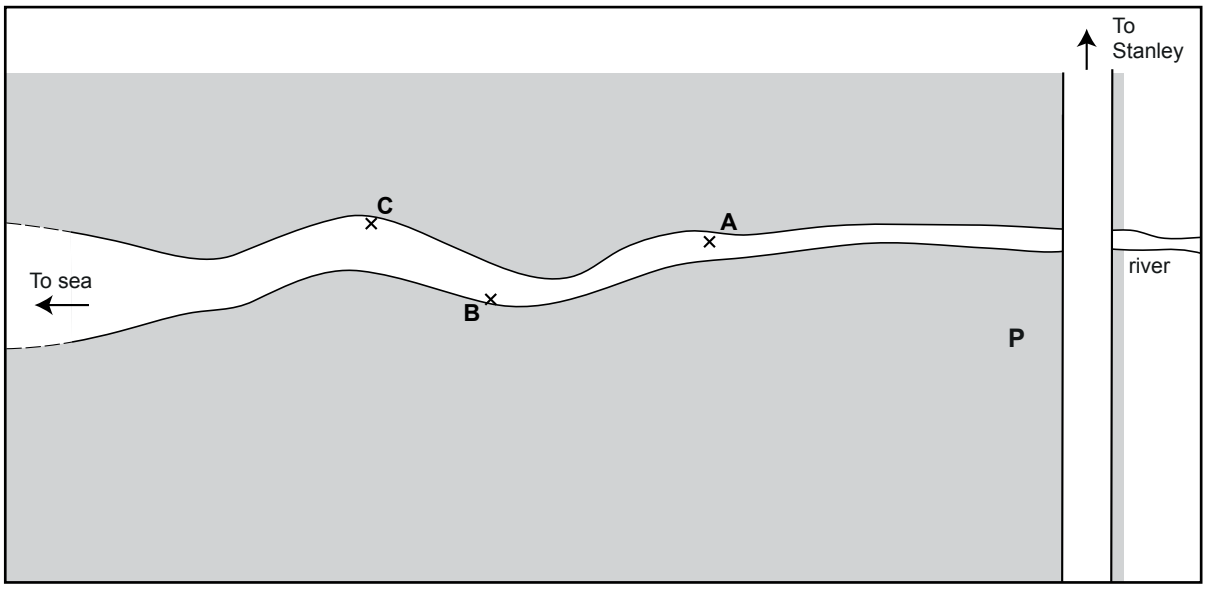

Fig. 22: Site plan of inlet

Fig. 23: Above: top of inlet where stream enters under road; Top right: View back toward road from inlet; Bottom right: view down inlet from same position.

A: 51° 34.045′ S, 058° 08.896′ W

High shore, just above river entry point, soft muddy sand.

Almost no fauna encountered except for a few specimens of *Boccardia* sp. (Fig. 23). Found in vertical burrows in the top centimeter of the sand/mud, this species was also found at sample sites further down the inlet. This species is not the same as that inhabiting the algal crusts sampled at Site 6.

B: 51° 34.053′ S, 058° 08.847′ W

High-mid shore, soft mud sievings. Figure 22 shows the soft mud encountered. Capitellids, typical of muddy sediments were evident along with more *Boccardia* and a few other families.

C: 51° 34.069′ S, 058° 08.615′ W

Ten minute walk further down the inlet along the stream bed from B. Sandy mud sediment with maldanid tubes (some with commensal amphipods) and arenicolidae casts visible on the mud surface. The same *Boccardia* sp. as previous still present also.

As the inlet was followed down the going became gradually softer and more difficult to negotiate. The site was left just prior to low tide as it was deemed that it was too risky to continue further along the inlet and there was also no evidence that the fauna might change significantly further on and so had been adequately sampled. The intention was to move on to a site in Estancia where the water ingress comes from the north as opposed to the east. Subsequently, the low tide there was 2 hours later than at the Mount Kent site enabling both to be sampled on the same tide.

Fig. 24: Soft mud

Fig. 25: A different Boccardia *species*

Site 8
Coral Creek, Estancia
22nd November 2011

Larger estuarine bay accessed from a road bridge over the inlet. A sandy beach with rocky patches moves down into softer sand as the tide ebbed, eventually uncovering larger sand banks further out that could be accessed at low tide.

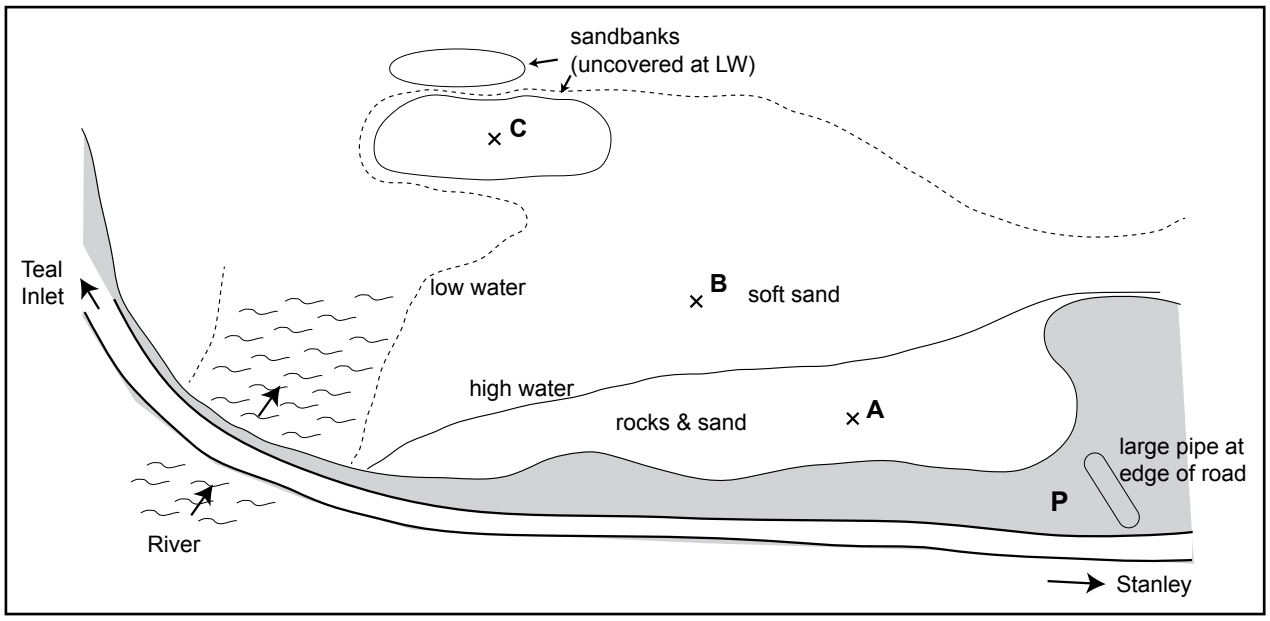

Fig. 26: Site plan of Coral Creek

Fig. 27: View out across sampling area at Coral Creek, from road access

A: 51° 39.036′ S, 058° 13.036′ W

High shore, shallow soft sand over a gravel base. Some juvenile arenicolidae and orbiniids dominated a sparse fauna. Some paraonids were also in the samples. These animals are very fragile and most of the specimens recovered were broken. One whole specimen was collected.

B: 51° 39.024′ S, 058° 13.067′ W

Mid shore, medium-fine sand, brown on top but grey below. More paraonid specimens and some goniadids. Still a very sparse fauna though.

C: 51° 38.946′ S, 058° 13.145′ W

Slightly raised bank of sand accessible at low tide, completely covered at high tide. Very soft fine sand, the top few centimetres of which are a consolidated turf of tiny sabellid tubes and maldanid tubes with orbiniid, goniadid and lumbrinerid worms among the tubes. Several sievings of this tube turf were made.

Fig. 28: Photograph of tube turf sampled at site C.

Site 9
Whalebone Cove, in front of *Lady Elizabeth* wreck
23rd November 2011

Rocky high shore leading quickly down on to a medium sand beach which is mostly covered except at very low tides. At these times, small sand bars uncover between the main shore and the offshore wreck. Arenicolid casts are evident on the sand surface from mid shore down to below low tide mark.

This shore was visited briefly following reports that two different species of lugworm could be found in the sands at low shore. However, along with the lugworms, some other interesting species that had not been collected elsewhere were also found in the very low shore sands, prompting a second visit later on (see Site 31).

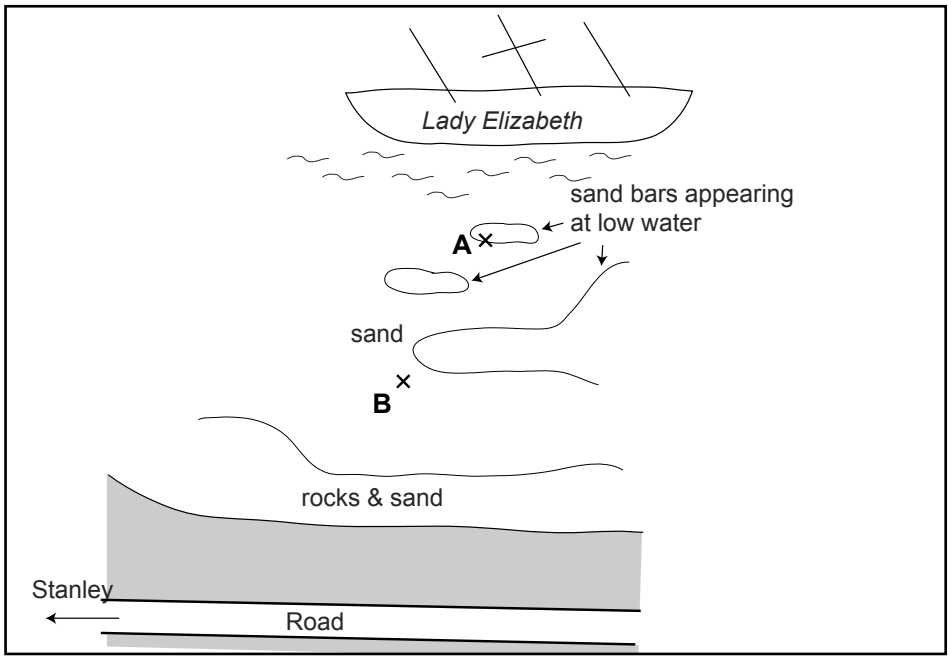

Fig. 29: Site plan for Whalebone Cove

Fig. 30: Wet day at Whalebone Cove; some sand bars visible on far shore toward wreck

A: 51° 41.330′ S, 057° 48.092′ W

Very low shore, medium sand. Two different species of lugworm do appear to be present although this requires more detailed investigation. Along with many lugworm, tubes of onuphid worms were also common. Other interesting specimens collected included *Spiophanes*, a spionid worm often found in sandy habitats but not collected up to this point, and a *Travisia*-like specimen. currently debated as to whether it belongs in the Scalibregmatidae or Opheliidae.

B: 51° 41.318′ S, 057° 48.011′ W

Mid shore, medium sand. More Arenicolidae collected from higher up the shore but only one of the species appears to be present at this level.

Fig. 31: The two possible species of Arenicolidae. The difference in colour, however, is not one of the distinctions between them.

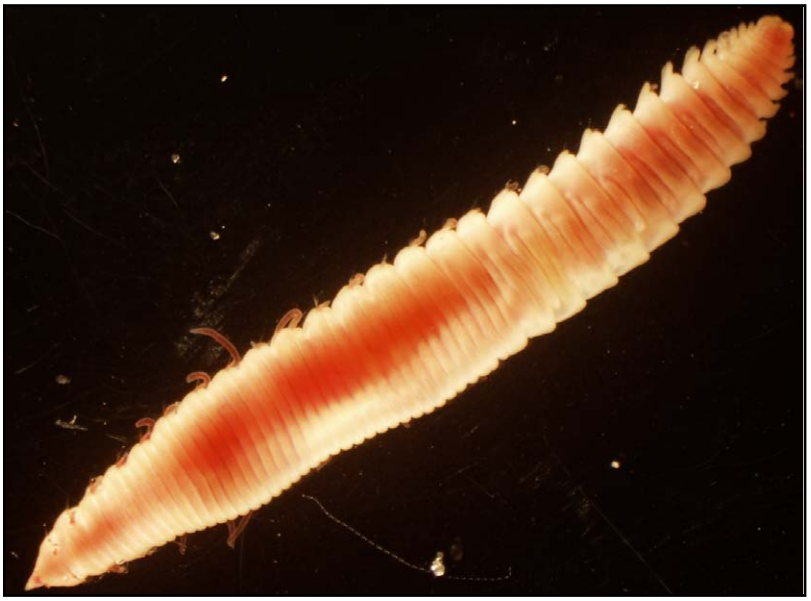

Fig.32: The scalibregmatid/opheliid collected from this site.

Sites 10-18
Cochon & Kidney Islands
24th-27th November

A survey of Cochon Island was undertaken by the Shallow Marine Surveys Group (SMSG) from 24th-27th November. As part of this survey I had the opportunity to collect polychaetes from around the island targeting as many different habitats as I could.

Unfortunately, early dives were affected by a large degree of surge on the seabed making conditions for collecting difficult and the last day was cut short by further incoming weather. However, despite such setbacks, the seabed around Cochon Island turned out to be extremely diverse in terms of habitat variety for polychaetes and it is unlikely that the collections made in such a short time will fully document the fauna present around the island.

Seven dives were made specifically for polychaete collection and additional specimens were also contributed from divers diving on three other sites. A single dive was made at Kidney Island on the way back. Photographs of specimens *in situ* were also taken where conditions allowed.

Large scaleworms (Polynoidae) were common under rocks as were ragworms (Nereididae, probably *Platynereis*) that attached membranous tubes to the undersides of the rocks. Two distinctly different paddleworms were collected, a large robust species with a uniformly blue/green body and no distinct patterning and a smaller species with dark green colouration down the centre of the body and paler yellow/green colour down each side. Other families represented by large specimens were Eunicidae, Flabelligeridae, Cirratulidae, Sabellidae, Terebellidae and Glyceridae.

The large, tough tubes of parchment worms (*Chaetopterus* sp.) were particularly common on the seabed surrounding the area. At first they were not noticeable as the encrusting pink algae that covers most of the available hard surfaces also grows over these tubes helping them meld into the surroundings. However, once spotted, the tubes are seen to be extremely numerous. Later diving at locations away from Cochon Island did not show this to be same elsewhere so the extent of their occupation of the Falkland Islands seabed is unclear. They were, however, common in all habitats around Cochon Island.

The species of *Chaetopterus* present is reported to be *variopedatus*, apparently introduced to the region in the 1950s. However, the identity of this European species is currently under investigation around the UK where it is believed to represent more than one species. It is therefore by no means certain which species the Falkland Islands specimens will turn out to be, if indeed it is the same as any of those currently described from European waters.

Fig. 33: The Hans Hansson*, the vessel used for the dive survey*

Fig. 34: Divers were deployed and retrieved by RIB

Fig. 35: Southern side of Cochon Island

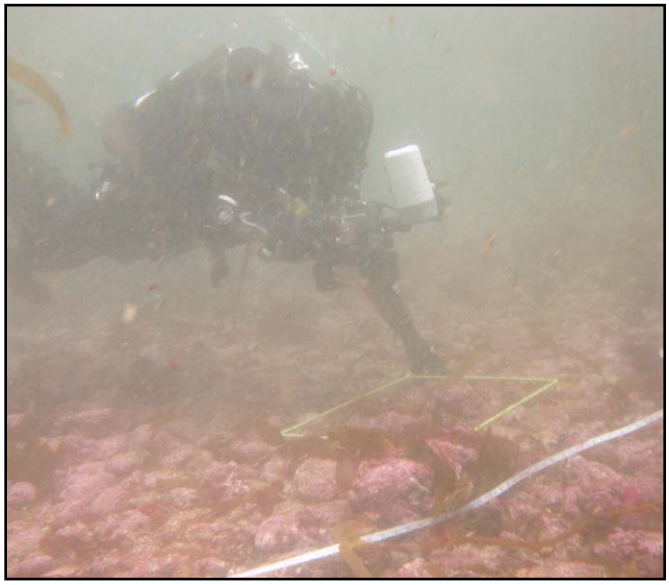

Fig. 36: SMSG diver undertaking seabed survey. Note the poor visibility in the water due to both plankton and heavy surge on the seabed.

Site 10: Southwest corner, sheltered
51° 36.287′ S, 057° 47.684′ W
24th November 2011

Coarse sand with overlying rocks. Rocks covered with pink encrusting algae that forms thin layers of crust. Giant kelp from seabed to surface. Turning over rocks frequently exposed the attached tubes of *Platynereis*. Large scaleworms (Polynoidae) were also common. Many rocks were covered with the calcareous tubes of spirorbid/serpulid worms. A strong surge on the seabed restricted much of the collecting.

Site 11: South
51° 36.377′ S, 057° 47.489′ W
24th November 2011

Larger rocks and boulders bedded into coarse sand. Thicker kelp. Diverse echinoderm macrofauna with sea urchins, starfish and brittlestars common. The large round tubes (up to 30cm in length) of parchment worms, *Chaetopterus* sp., were also apparent and common once spotted attached to the rocks. These tubes were often disguised by being covered by the encrusting pink algae that seemed to cover most surfaces. Several scaleworms were collected from under rocks as well as a large dark green paddleworm (Phyllodocidae) and a flabelligerid (possibly *Pherusa* sp.). Surge over the seabed was still an inhibiting factor while diving.

Site 12: Southwest corner, exposed
51° 36.152′ S, 057° 47.773′ W
25th November 2011

Embedded boulders/bedrock with larger areas of coarse shell and sand between the outcroppings. The sediment had a thick layer of dead shell over coarse sand with some silt content holding the sediment together. Boulders had many *Chaetopterus* openly attached to the rock face with sea urchins and starfish also common. Kelp holdfasts were widely spaced. The encrusting algae formed thin, loose crusts that could be broken off by hand easily. Two different paddleworms were collected, the dark green large species collected previously and a smaller, thinner species with two pale green stripes down either side of the body. A blood worm (Glyceridae) was found in sievings that were done from a sand sample taken from the seabed. No scaleworms were collected from this site although several, the same as previously collected, were seen under rocks. This site had one of the most diverse family lists from the island and all of the samples up to this point.

Fig. 37: Chaetopterus *tube, approx. 30 cm in length*

Fig. 38: Flabelligerid specimen on rock covered in pink encrusting algae

Site 13: North
51° 36.322′ S, 057° 47.132′ W
25th November 2011

Vertical wall and ridges with narrow ledges between them and then further steep drops. Large overhanging areas. Most of the hard surfaces covered in loose pink algal crusts not directly attached to the underlying rock. Many bivalves attached to the kelp and other algae.

Many of the small seaweeds and hydroids had spirorbid tubes attached and samples were collected. A sabellid fan-worm was also found and collected.

Site 14: Western end
51° 36.217′ S, 057° 47.585′ W
25th November 2011

Similar looking site to 13 but more shallow. Large overhang with a large sabellid community with tubes attached to the rock. Some tubes were also found clustered around *Chaetopterus* tubes. Many small brachiopods were also seen at this site.

A large scraping sample was taken of the brachiopod/sabellid/spirorbid community found under the rock overhang. This sample contains the highest number of polychaete families so far along with another sample from the island taken at site 16. This was also one of only 2 sites, both on Cochon Island, to contain specimens of a small chrysopetalid polychaete of the genus *Dysponetus*.

Site 15: Southeast corner
51° 36.449′ S, 057° 47.150′ W
26th November 2011

Wall leading down to rocks/cobbles on coarse sand. There were no open patches of sand seen. Surge was much reduced on this site. No kelp was seen at the lower depths. Many nudibranchs were seen on the hydroids.

Turning rocks over revealed several new animals not recorded from the other sites including specimens of Cirratulidae, Hesionidae and Eunicidae. Additional specimens were collected of the large paddleworm, *Platynereis* and scaleworms recorded previously.

Fig. 39: The large paddleworm collected from several sites around Cochon Island

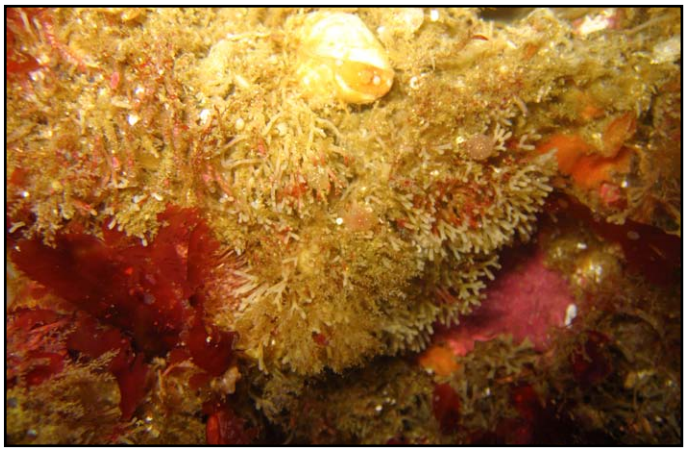

Fig. 40: Hydroid/bryozoan turf

Site 16: Northeast corner
51° 36.366′ S, 057° 47.082′ W
26th November 2011

Deep gully with a few pieces of wreckage in the bottom. Steep walls around the gully with some small ledges. Much pink encrusting algae but not so many loose crusts. Large *Megabalanus* barnacles at the top of the gully wall. Bryozoan/hydroid turf on some of the sheltered overhangs.

A scraping of the hydroid/bryozoan turf was taken as well as a sediment sample from under a large rock to be sieved onboard. This site and site 14 were the most diverse from all of the samples taken around Cochon Island and anywhere else up to now. It was also the only other site where the chrysopetalid *Dysponetus* was recorded. Both records were from turf scrapings from walls.

Site 17: South
51° 36.403′ S, 057° 47.335′ W
27th November 2011

Single specimen of *Platynereis* retrieved from kelp by 2 divers on their return to the surface.

Site 18: Kidney Island
51° 37.517′ S, 057° 45.301′ W
27th November 2011

Shallow cove with fine-medium sand seabed and widely spaced kelp. Serolid isopods commonly seen on the seabed as well as patches of 'worm garden'. These patches were visible by a 'roughened' look to the sand surface that, on closer inspection, turned out to be the tops of tubes poking out above the sand surface. The heads of worms were visible at the end of some tubes waving around in the water column, probably feeding. A sample of these tubes was taken along with the underlying sand. The tubes were of onuphid worms and the surrounding community also turned out to be quite rich with a large list of families represented. The number of recorded families places this site towards the top end of the list of diverse sites visited, second only to some sites around Cochon Island.

Fig. 41: 'Worm garden', worm heads can be seen above the ends of the tubes

Fig. 42: Tubes sieved out of a sample of the 'worm garden'

At the time of writing this report, the following stations have not been identified to family level so comments on diversity and presence of some families is taken only from observations made at the time of collecting.

Site 19

Sea Lion Island, southeast coast below Tussac Pond
52° 26.155′ S, 059° 05.270′ W
28-29 November 2011

Flat, open area of rock ledges that drop abruptly to the sea. Covered at high tide but even at low tide with a shallow cover of a centimeter or two of water. Flat pools with much pink encrusting algae and small seaweeds growing over the rock. The raised edges of the rock have crevices that can be prised open as the rock is very soft and slate-like in places. Some of these crevices had some silt and small worms inside them. At mid-low tide level most of the area retains a slight cover of water that includes where the 'turf' occurs. Some of the crevices dry out. Samples A & B were taken on the 28th, sample C on the 29th. As all samples were taken within a close radius only a single position was taken for all.

A: scraping of silt-encrusted algal 'turf'
B: fauna from split crevices, close to edge of ledges
C: fauna from split crevices, furthest from edge of ledges

Fig. 43: Above: Flat ledges at site 19; Below: Close-up view of the slate-like crevices that could be levered up to sample the fauna within.

Site 20
Sea Lion Island, East Loafers Bay, south coast
28-29 November 2011

Gravel/pebble shore gently shelving down into rock ledges. The ledges are flat and open similar to those at site 19 but with more and deeper fissures. The rock was not as soft or splittable as at 19 and there was more encrusting algae. Samples A & B were taken on the 28th, sample C on the 29th.

A: 52° 26.306′ S, 059° 06.229′ W
Mid-low shore, chips of the pink encrusting algae were removed from a rock fissure. This area was covered with some water at all states of tide.

B: 52° 26.275′ S, 059° 06.341′ W
High shore, worms collected from under large, clean rounded stones on the main shore of the bay. The smooth stones were embedded in coarse grey well sorted sand. The worms are likely to be oligochaetes not polychaetes.

C: 52° 26.325′ S, 059° 06.090′ W
Mid shore area further round the cliffs from sample A. A large pool with a covering of coarse grey shale over medium sand/silt, some seaweeds embedded into the sand. Several samples were dug and sieved.

Fig. 44: Grey shale in rock pool at site C.

Site 21
Stanley west; in front of brass sculpture just east of the *Jhelum* wreck
51° 41.402′ S, 057° 52.580′ W

Rocky shore with small stones over coarse sand and gravel. Wide area of algae-covered rocks at mid-low shore. Samples were taken at low shore under the rocks and in the underlying sand. First impressions were mainly of an abundance of terebellids with some nereidids, maldanids and cirratulids.

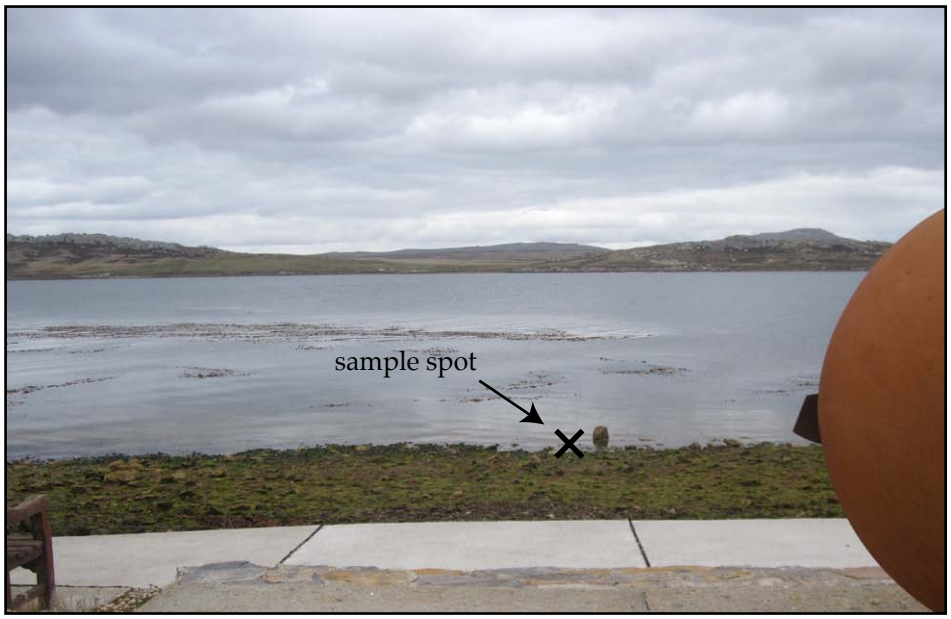

Fig. 45: View of foreshore in front of the sculpture where sampling was done.

Fig. 46: The sediment was a mixture of sand, gravel and mussel shell.

Sites 22-30
Egg Harbour & Kelp Harbour
2nd-4th December 2011

The second SMSG survey during the trip took place from 2-4 December 2011. Egg Harbour is situated on the central east side of Falkland Sound between the two main islands of West and East Falkland. Kelp Harbour is a short distance further north. Samples were taken both by diving and on the shores at the launch sites.

The seabed here was very different to that at Cochon and Kidney Islands and did not give the impression of being as diverse although that may yet prove otherwise. The ubiquitous pink encrusting algae was conspicuously absent as were the common *Chaetopterus* tubes recorded before. Nereid and terebellid tubes were commonly attached to the undersides of rocks and the sandy sediments frequently contained nephtyid worms, only recorded at one previous site on Cochon Island.

Site 22: Parker Shoal, Egg Harbour
51° 47.471′ S, 059° 24.360′ W
2nd December 2011

Offshore shoal located by the evidence of giant kelp at the surface indicating a shallower seabed below than in the surrounding area. Small-medium sized rocks on the seabed. Many sea squirts, brachiopods and mussels attached together in clumps. Patches of coarse sand and silt in between the kelp holdfasts and mussel clumps. Fauna was collected mainly by searching under rocks. Numerous tubes of *Platynereis* evident on the undersides of the rocks. Another large flabelligerid, like that from site 11 found, also some large terebellids, a possible scalibregmatid and a large pectinarid. A sediment sample sieved onshore contained several nephtyidae (catworms), a family only recorded once from a station off Cochon Island.

Site 23: off Long Point, Egg Harbour
51° 49.477′ S, 059° 23.926′ W
2nd December 2011

Lessonia kelp on the seabed with lots of kelp debris and small stones around. Sediment finer than at site 22 with more silt and organic detritus. Several pectinariid tubes found on the sand surface, most with live worms inside. Mostly nereid and terebellid tubes under stones. Some large brachiopods around. A sediment sample was taken for sieving, again containing nephtyids.

Fig. 47: Launching the RIB at Egg Harbour

Fig. 48: Pectinariid tube on the seabed, approx. 5-6cm long

Site 24: Egg Harbour, by jetty
51° 50.865′ S, 059° 23.168′ W
2nd December 2011

Shallow dive around the base of the derelict jetty where the RIB was launched. Rocky seabed covered with an algal mat. Several large cirratulids collected.

Site 25: bay east of Shag Rookery Point
51° 50.353′ S, 059° 27.351′ W
3rd December 2011

Shore collection. Rocky sloping shore, from mid-low shore hemmed round with mussels embedded in silty coarse sand/rock. Some large nereids found under stones with many *Boccardia* and other tubes in the interface between the sand and the stones.

Fig. 49: Launching at site 25

Fig. 50: Shore type at site 25: silty coarse sand with small mussels between embedded rocks

Site 26: southwest face of High Cliff Island
51° 48.578′ S, 059° 28.805′ W
3rd December 2011

Shallow dive among widely spaced kelp holdfasts (*Macrocystis* & *Lessonia*). Rocks on the bottom were very large and flat, difficult to move. Little underneath rocks except nereid and terebellid tubes as seen before, although the terebellids appeared to be more abundant. Large syllid collected from under one stone. Another sediment sample was taken, Nephtyidae still common. A blade of *Macrocystis* kelp covered with spirorbid tubes was collected.

Fig. 51: Large scaleworm found under stone. Portion of a syllid/hesionid visible in top right corner

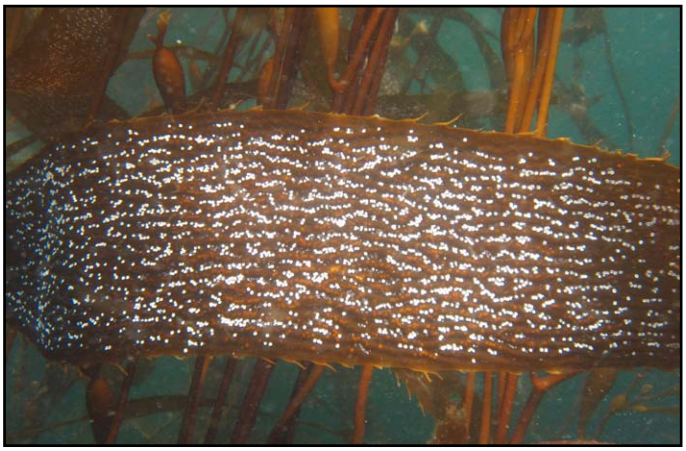

Fig. 52: Macrocystis *blade covered with spirorbid tubes*

Site 27: Shag Rookery Point
51° 49.345′ S, 059° 26.719′ W
3rd December 2011

Shallow dive with flat rocks on the seabed partially embedded in soft silty sand. Rock ledges to the shallower end with fractured edges that could be prised open. Many nereid and terebellid tubes under the rocks, several scale-worms seen also. Widely spaced kelp holdfasts. No sediment sample for sieving taken at this site as there was no loose sediment to access.

Fig. 53: Rocky seabed at site 27

Fig. 54: Terebellids on underside of overturned stone

Site 28: Kelp Harbour, by stone corral
51° 48.597′ S, 059° 19.433′ W
4th December 2011

Shore collection. Large muddy sand shore with shallow depressions with evidence of many tubes around the sides. Some samples taken and sieved. Initial impressions are of a large onuphid community

Site 29: Kelp Harbour, off causeway to small island
4th December 2011

A: 51° 47.715′ S, 059° 18.400′ W
Shore collection. Mid-low shore on the mainland end of the causeway by a small sloping 'beach'. Soft sand leading down to coralline coarse sand. Many animals visible in samples from the sediment. Several spadefuls sieved.

B: Snorkel collection. Sediment collected by snorkeling 20-30 m out from sample A, coralline sand at approx. 0.5 m depth, sieved as with samples from A. Again, many animals visible in samples.

Fig. 55: Muddy shore below stone corral, site 28

Fig. 56: Coralline sand shore, site 29

Site 30: Kelp Harbour
51° 47.021′ S, 059° 19.848′ W
4th December 2011

Widely spaced kelp with some large open areas between holdfasts. Flat rocks spread out, embedded in silty fine sand. No patches of sediment clear of rock to take a dug sample.

Many nereid and terebellid tubes attached under rocks, also many scaleworms, some different in appearance to the species most commonly seen on dives. Possible chaetopterid tube community found attached to one rock that a sample was taken from.

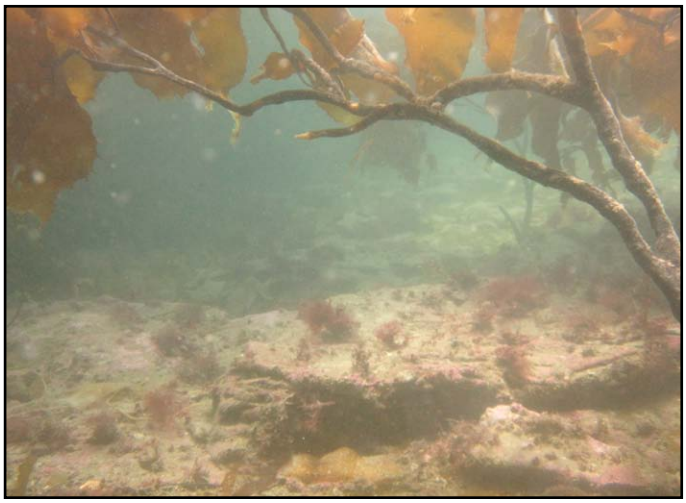

Fig. 57: Rock ledges, site 30

Fig. 58: Terebellid still inside tube attached to underside of overturned stone

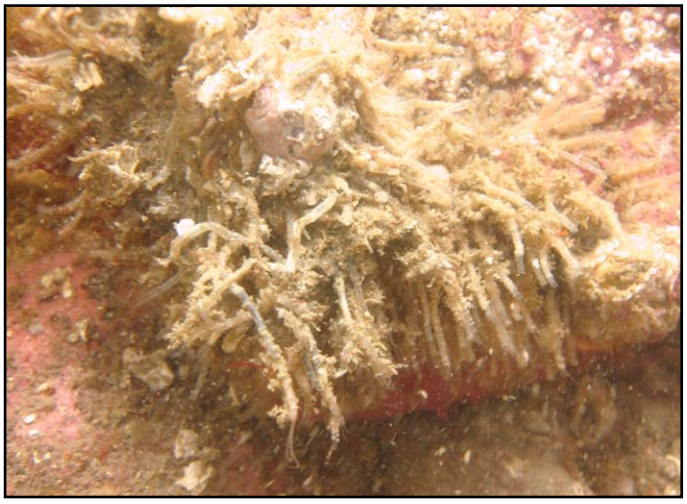

Fig. 59: Colony of tubeworms (Chaetopteridae?) under stone, site 30

Fig. 60: SMSG and me, Egg Harbour House.

Site 31
Whalebone Cove (as for site 9)
5th December 2011

A: 51° 41.307′ S, 057° 47.985′ W

High-mid shore samples taken under algae-covered rocks. Arenicolidae juveniles, *Boccardia*, Terebellidae, Orbiniidae and a paddleworm were among the specimens collected.

B: 51° 41.308′ S, 057° 48.005′ W

Mid-low shore in soft medium sand. A few large Arenicolidae with more specimens of Goniadidae, Orbiniidae and Lumbrineridae.

C: 51° 41.325′ S, 057° 48.037′ W

Low shore. Unfortunately, the tide on this occasion was not as big which, combined with a strong onshore wind, meant that it did not go out as far and it was not possible to sample as far down the shore as I had done previously, although samples were taken from areas still covered by some tide. More Arenicolidae and some *Spiophanes* were collected.

Fig. 61: Spiophanes *from site 31*

Fig. 62: Paddleworm from site 31

Site 32
Stanley Marina, below Marina bridge
51° 41.600′ S, 057° 48.073′ W
5th December 2011

A small *Macrocystis* holdfast was retrieved from just off the rocky edge to the water and kept in its entirety to investigate the fauna associated with the holdfast.

Fig. 63: Foreshore east of Marina bridge

Fig. 64: Small holdfast with rest of kelp still attached

Site 33
Mullet Creek, near Stanley
7th December 2011

Small, winding creek exiting south to Port Harriet inlet. Very sheltered but not muddy.

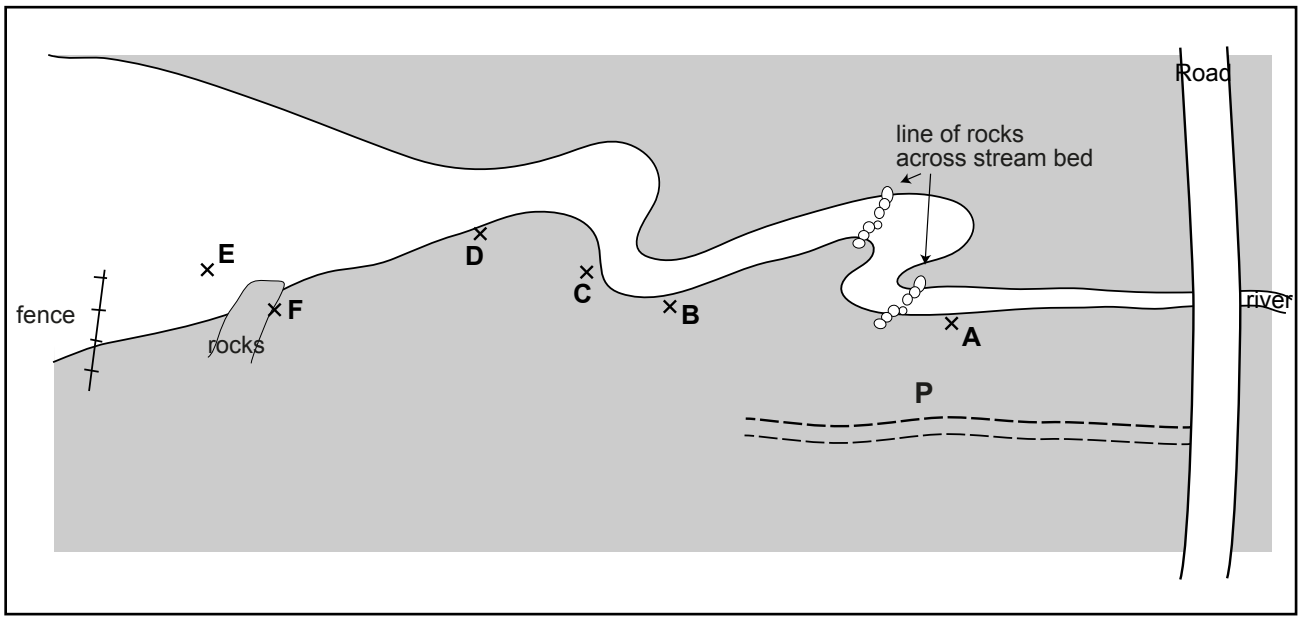

Fig. 65: Site plan for Mullet Creek

Fig. 66: View down Mullet Creek

A: 51° 43.099′ S, 057° 54.951′ W

High shore, rocky with coarse gravelly sand, very hard. No diversity of fauna readily apparent. Some *Boccardia* of the soft burrowing variety and some oligochaetes.

B: 51° 43.121′ S, 057° 54.833′ W

High-mid shore. Coarse gravelly/pebbly sand with patches of grey Arenicolidae casts near the waters edge. Specimens of both apparent arenicolid species collected, many *Boccardia*.

C: 51° 43.150′ S, 057° 54.4545′ W

Mid-low shore. Slightly finer (than B) medium sand. More arenicolid juveniles collected together with Orbiniidae, Paraonidae and Maldanidae.

D: 51° 43.155′ S, 057° 54.517′ W

Mid-low shore. Similar to C but with an absence of the Arenicolidae casts. Some sediment sieved from this site.

E: 51° 43.146′ S, 057° 54.333′ W

Low shore. Medium-fine sand with an algal mat over the surface. More diversity of fauna appearing with some *Spiophanes* and *Polydora* spionids as well as more Maldanidae, Orbiniidae and Paraonidae. Small bivalves common in the sediment also.

F: 51° 43.138′ S, 057° 54.345′ W

Mid-low shore. Under rocks and in gravel towards the edge of the creek. Not much fauna, only some Orbiniidae and a syllid collected from here.

Fig. 67: Looking through the soft sand of Mullet Creek for polychaetes

Site 34
Sand Bay, Port Harriet
8th December 2011

Large sandy bay, below the abattoir, split at the high shore around a rocky promontory. A small stream flows into the bay along the far northern edge. The sand extends past the low tide mark but there are rocky banks uncovered in patches as the tide recedes.

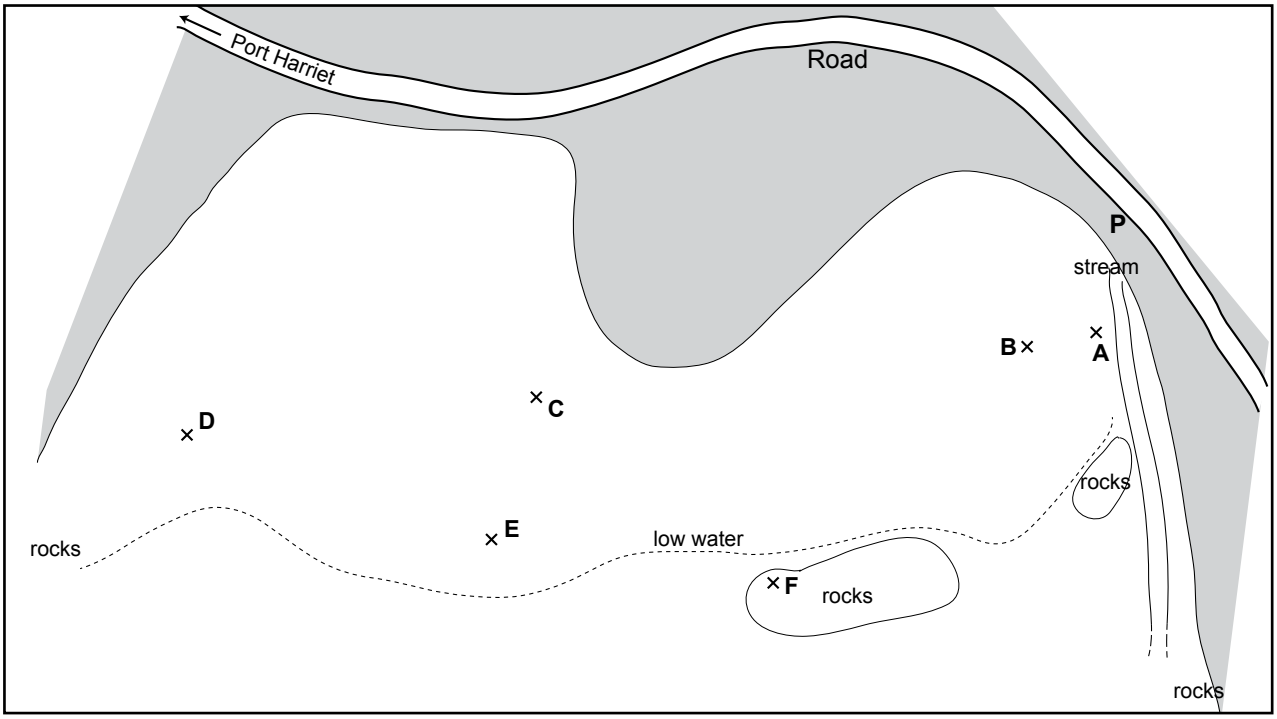

Fig. 68: Site plan for Sand Bay

Fig. 69: View over Sand Bay from central promotory

A: 51° 44.098′ S, 058° 00.626′ W
High shore, alongside the stream. Gravelly coarse sand, mostly with maldanid tubes made of coarse grains.

B: 51° 44.105′ S, 058° 00.619′ W
High shore, at the same level and with the same sediment type as A, but further away from the freshwater input of the stream on flat sand. Fauna still mostly made up of small maldanid tubes.

C: 51° 44.169′ S, 058° 00.610′ W
High-mid shore, further south and round the small headland. Softer, fine sand over grey clay or coarse gravelly sand. One large phyllodocid found that was different to any other paddleworm yet collected. Other specimens included more Maldanidae, Goniadidae and Capitellidae.

D: 51° 44.231′ S, 058° 00.585′ W
Mid-low shore. Very soft fine sand, no gravel but with layers of brown plant detritus a few centimetres down. A population of nereids appeared to be associated with the detritus layers and were different to the other nereid species so far collected. These animals seemed to be much more fragile than most nereids and much care was needed in collecting them. Some Maldanidae specimens collected but little other fauna apparent.

E: 51° 44.152′ S, 058° 00.529′ W
Low shore. Soft fine sand over hand-sized rocks buried beneath, some clay. Large terebellids found in tubes between the rocks and sand of a type not recognized from previous samples. Many large capitellids also.

F: 51° 44.130′ S, 058° 00.550′ W
Mid shore. Under rocks on a raised rocky sandbank, dotted with clumps of mussels. Many nereids in tubes under the rocks, probably *Platynereis*.

Fig. 70: Plant detritus layers in the sand that contained the previously unseen Nereididae specimens

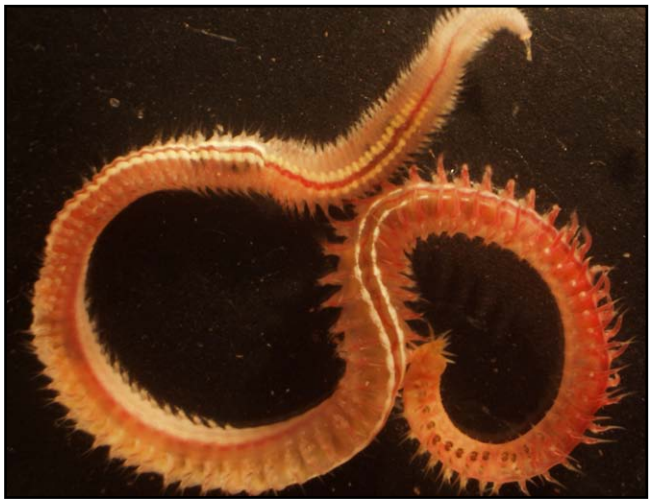

Fig. 71: Different nereid specimen collected at Sand Bay

Site 35
Teal Creek, near Darwin
9th December 2011

Remote, wide creek leading out to Darwin Harbour. Very muddy sediment with large mud flats exposed as the tide ebbs. Vehicle track gives access to small bays along the edge of the inlet. Sampling was undertaken at a small bay where less mud flat was exposed but the closer proximity of the water allowed for easier sampling.

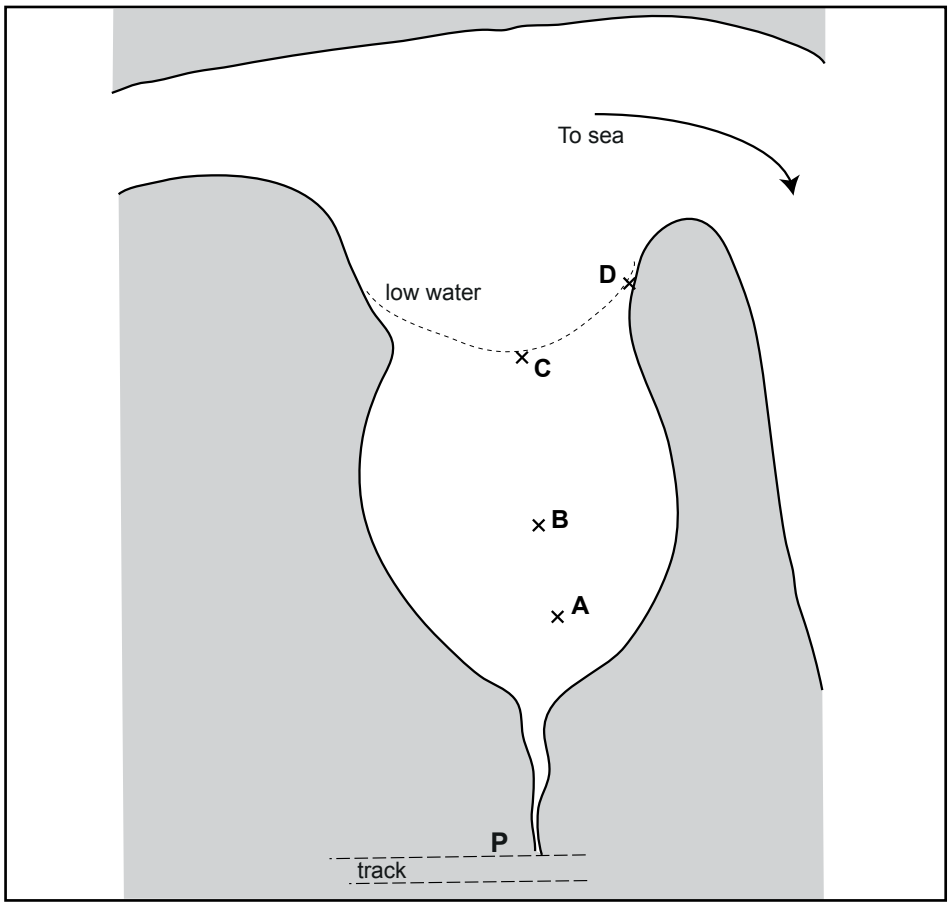

Fig. 72: Site plan for Teal Creek

Fig. 73: Small bay off Teal Creek where sampling was done

A: 51° 49.202′ S, 058° 55.615′ W

High shore, soft mud clay and loose gravel. Very little fauna obvious apart from maldanid tubes.

B: 51° 49.231′ S, 058° 55.573′ W

Mid shore. Soft mud over hand-sized rocks, softer and deeper mud than A with many worm tubes. Still mainly maldanid worms with some nereids also. 1 small bivalve.

C: 51° 49.236′ S, 058° 55.563′ W

Low shore, sediment as for B but deeper mud. Nereids, maldanids and terebellids all collected, the nereid species appears to be the same as the recent species found at site 34 (Sand Bay). Some mud and gravel was sieved.

D: 51° 49.248′ S, 058° 55.561′ W

Mid shore. Under rocks along the shore at the outer corner of the bay. Mostly Nereididae, more than 1 species present. Two large terebellids in tubes attached to rock also collected.

Fig. 74: Soft mud where samples were collected

Site 36
Camilla Creek, near Darwin
9th December 2011

Similar but larger muddy creek to Teal, winding down to Brenton Lock. The water input to this creek originates from Grantham Sound, to the north of Falkland Sound, whereas the tide at Teal Creek flows in from Choiseul Sound to the southeast of East Falkland. As with sites 7 & 8, the different tidal inputs mean that these two sites could be sampled on the same low tide 2 hours apart.

The vehicle access track ends at a gate just above a pebbly bank from which the shore could be accessed. All samples were taken in a small bay to the left of the pebble bank. A large expanse of very soft deep mud flat is exposed by the low tide, deeper mud than at Teal Creek. Access to water was possible from some harder sections of the shore.

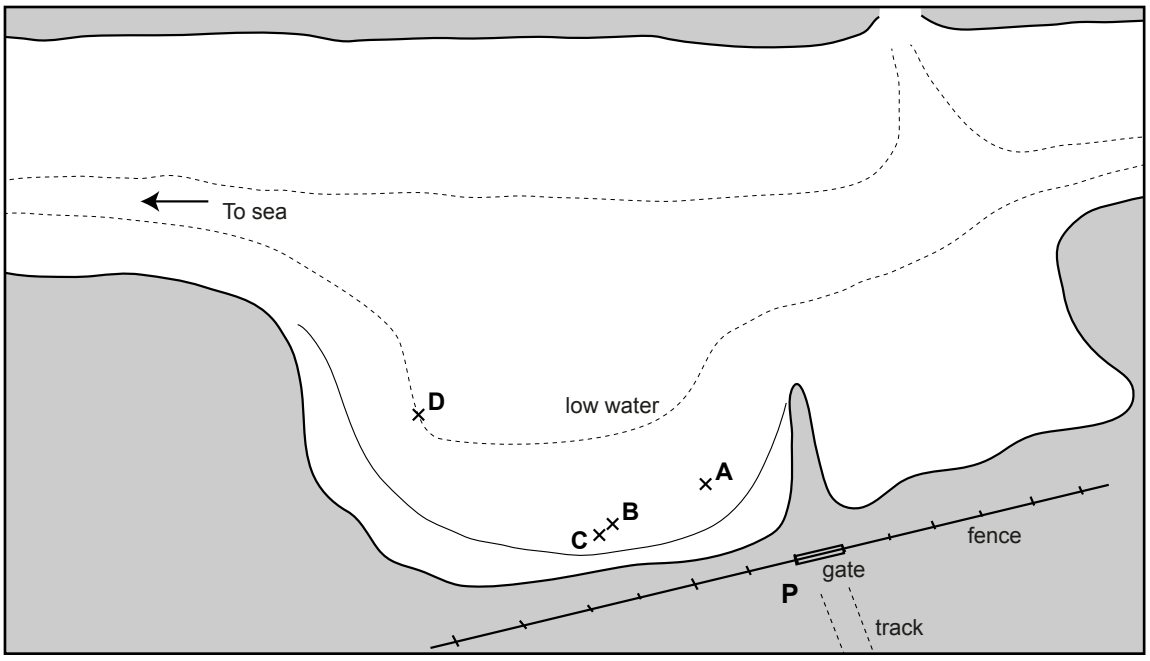

Fig. 75: Site plan for Camilla Creek

Fig. 76: Large expanse of mud flat exposed at Camilla Creek

A: 51° 46.580′ S, 058° 57.704′ W
High-mid shore, soft mud over loose gravel. Mainly maldanid tubes present.

B: 51° 46.668′ S, 058° 57.760′ W
Mid shore, deep mud. Several samples dug and sieved.

C: No position as only a few metres from B.
Mid shore, mud over rocks and gravel. One large bivalve and some nereids of the recent species found at sites 34 & 35. Maldanidae present also.

D: 51° 46.680′ S, 058° 57.760′ W
Low shore, further round the bay in soft, muddy sand. Fauna still mostly maldanid tubes but 2 different species of paddleworm also collected.

Fig. 77: Another example of the nereid only found at the last three sites

Fig. 78: Paddleworm from Camilla Creek

Results

In total, seventy-six samples were collected across the 36 sites visited. This included nineteen different shores around East Falkland as well as samples from fifteen dives. Half of these have now been identified to family level producing a list of 33 families present (Table 1). This figure does not include the Archiannelida, a group of polychaete families which have very few features. These will be separated further at a later date.

The syllidae are the most common family with most samples containing specimens. The sieved sediment samples always contained many tiny specimens of this family. Other common families recorded are the Maldanidae, Capitellidae, Cirratulidae and Nereididae, all of which are represented by several species.

Intertidally, the Maldanidae appeared to be the dominant group of larger animals, their tubes often being a major component of the sediment. However, subtidally, a different, very small species of maldanid was also common in samples. Nereididae were common under stones, both free-living and in tubes, and were present across both intertidal and subtidal samples. In the subtidal samples, larger members of Nereididae, Terebellidae and Phyllodocidae were prominent with the smaller, less noticed specimens of Sabellidae and Syllidae also being recorded at almost every site once the samples were looked at in detail.

Work will now start on the more time-consuming identifications to species level. As so little work has been done on the Falkland Islands polychaetes before, this is likely to be a protracted process due to the necessary literature research that will be required to identify each species. However, it is expected that due to the lack of previous research, there is a high potential for new species to be found among the samples.

Site No.	1			2					3				4	5			6				7			8			9		10	11	12	13	14	15		16		17	18	
Family	A	B	C	A	B	C	D	E	A	B	C	D		A	B	C	A	B	C	D	A	B	C	A	B	C	A	B						A	B	A	B		A	B
CHRYSOPETALIDAE																																	●			●			
POLYNOIDAE		●	●			●	●				●																		●	●	●	●	●	●	●	●	●		●
PHOLOIDAE																																●		●						
PHYLLODOCIDAE		●					●		●					●					●	●			●						●	●	●	●	●	●	●		●			
HESIONIDAE																																		●						
SYLLIDAE	●	●		●	●	●	●	●			●		●	●	●			●	●	●	●	●	●		●		●		●	●	●	●	●	●		●			●	
NEREIDIDAE	●	●	●			●	●						●				●	●	●	●		●							●	●		●		●		●	●		●
SPHAERODORIDAE																													●				●			●			
NEPHTYIDAE																																				●				
GLYCERIDAE																															●								●
GONIADIDAE				●	●				●	●		●			●									●	●		●				●								
LUMBRINERIDAE			●	●	●	●					●				●									●	●		●				●								●
EUNICIDAE																	●																	●						
ONUPHIDAE					●			●																			●													●
DORVILLEIDAE																															●	●	●			●			
PARAONIDAE										●					●									●	●						●								●
QUESTIDAE																																							
ORBINIIDAE	●		●	●	●	●		●	●	●	●	●			●				●					●		●	●												●
SPIONIDAE						●		●																																
SPIONIDAE (Spiophanes)																											●													
SPIONIDAE (Spio)				●																																				
SPIONIDAE (Scolelepis)																											●													
SPIONIDAE (Boccardia)														●	●		●	●	●	●	●	●	●						●											
SPIONIDAE (Polydora)		●																															●			●			
SPIONIDAE (Malacoceros)													●					●	●	●											●									
CHAETOPTERIDAE	●																													●			●			●			
CIRRATULIDAE	●	●	●		●		●				●		●	●				●	●	●									●		●		●	●		●			●	
ARENICOLIDAE	●			●	●					●					●					●			●			●	●												
ACROCIRRIDAE																																				●				
FLABELLIGERIDAE																														●			●						
SCALIBREGMATIDAE																											●													
OPHELIIDAE							●																																	
CAPITELLIDAE	●			●	●			●	●	●			●	●	●		●	●			●	●					●				●		●						●
MALDANIDAE		●	●	●	●	●	●	●	●	●		●										●			●			●	●		●	●			●		●		●
AMPHARETIDAE																																	●			●			
TEREBELLIDAE	●	●	●				●				●		●				●			●									●	●	●	●	●			●			●	
SABELLIDAE							●				●						●	●	●				●						●	●	●	●	●			●			●	
SERPULIDAE													●				●																							
SPIRORBIDAE							●				●																		●		●	●	●			●				
OLIGOCHAETA	●	●	●	●		●		●			●		●	●	●		●		●	●		●									●		●			●			●	
ARCHIANNELIDA					●														●			●																	●

Table 1: Polychaete families identified from Sites 1-18.

One group that has already been identified as of interest are the specimens of the family Chrysopetalidae, recorded from 2 sites (14 & 16) at Cochon Island. These small polychaetes are in the genus *Dysponetus*, a group infrequently recorded in any survey or collection. There are currently only twelve species described around the world with no previous records of this genus from the Falkland Islands although there are records of other *Dysponetus* species in the southern hemisphere including the Antarctic. The status of the Cochon Island specimens is now under investigation as to whether they are a new species or a new record. Either way, it is intended to include the records in a paper currently being written on a species of the same genus from the UK.

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Public Outreach

5th December 2011

Public Talk, Government House, Port Stanley

Title: The Wonderful World of Worms

An introduction to what polychaetes are, their importance in the marine environment and the purpose of my research. Included a summary of the fieldwork completed during the trip. Approx. 10-15 attendees.

5th December 2011

Interview by Falkland Islands Television

The public talk was filmed by FITV and I was interviewed afterwards about my research, the purpose of the trip and how it had gone. Broadcast later that week.

12th December 2011

Scientific Talk, Fisheries Department

Title: Collection & Identification of Polychaetes

How to collect and treat polychaetes in the field and the laboratory to get good specimens for identification. Approx. 10 attendees.

23rd February 2012
Talk for the Biodiversity & Systematic Biology Department, National Museum Wales, Cardiff
Title: Polychaete Research in the Falkland Islands
The purpose and conduct of the research. Approx. 20 staff attended.

February 2012
Article submitted to *Penguin News* (not yet published)
Title: Discovering Marine Worms of the Falkland Islands

May 2012
Article in *Symbiont* (Departmental newsletter, circulated to Museum and external partners)
Title: Polychaetes of the Falkland Islands

Finance

Shackleton Scholarship Fund award:	**£2000**
Return Flights: UK-Falkland Islands incl. tax.	£1572.00
Vehicle Fuel*	£56.50
Vehicle Hire*	£160.00
Accommodation (1nt Darwin Lodge)	£74.00
Food	£129.32
Total claim:	**£1991.82**

* Dr Paul Brewin of SMSG loaned me his car for the first 2 weeks of the trip while he was on holiday, so fuel was the only transport cost. A car was then hired for 4 days toward the end of the trip for more sampling.

National Museum Wales contribution: **£1062.33**

NMW reimbursed any extra costs not covered by the Shackleton grant. These included postage of equipment out to the Falkland Islands before the trip and postage of specimens back to the UK, the flight to Sea Lion Island and other food, accommodation and consumables not included above.

Total Cost of trip: **£3054.15**